NASA SBIR/STTR Technologies

A2.07-9532 - SR-CATS: A Short-Range Clear Air Turbulence Sensor

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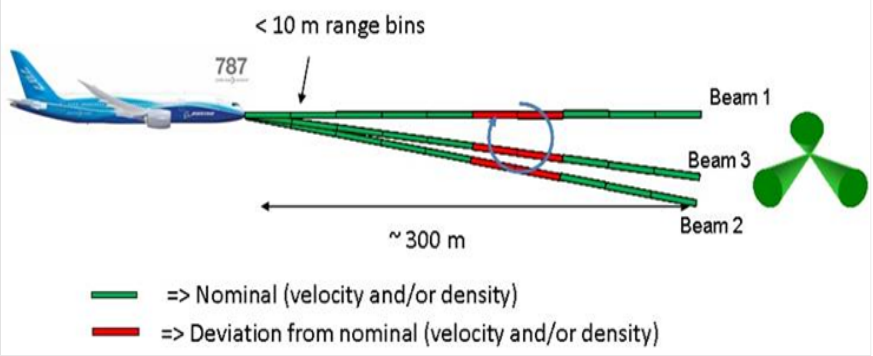
Identification and Significance of Innovation

SR-CATS is a range-resolved LIDAR to detect deviations of air velocity and density between 60 m and 300 m ahead of the aircraft, providing clear-air turbulence data to an aircraft automatic compensation system. The system also provides an air data solution, including air speed and angle of attack, via optical means (no protruding probes or holes to ice/clog). The resulting compact instrument will be fully integrated into the host airframe with a flush-mounted optical port. This technology builds on Michigan Aerospace's extensive experience with air data sensors.



CAT detection is achieved with the three beams sensing other-than-nominal velocity/density in some range bins compared to the rest.

Estimated TRL at beginning and end of contract: (Begin: 4 End: 5)

Technical Objectives and Work Plan

Technical Objectives:
1. Establish final SR-CATS engineering model design.
2. Fabricate and assembly of the SR-CATS engineering model.
3. Demonstrate SR-CATS technology capabilities through development and execution of a test plan using the engineering model.

Work Plan tasks:
Year 1:
1. Program management (throughout program) and kickoff meeting.
2. SR-CATS requirements and risk analysis.
3. Detailed system design of SR-CATS engineering model.
4. Parts procurement and fabrication.

Year 2:
5. Program management (throughout program).
6. Engineering model build effort.
7. System characterization and testing.
8. Performance verification testing.
9. Final report, including recommendations for flight testing.

NASA Applications

SR-CATS will allow NASA aircraft the benefit of having a clear-air turbulence detection system for predictive gust alleviation control and an optical air data system in one package, suitable for general use by NASA aircraft as well as for flight research concerning clear-air turbulence and scientific studies of atmospheric processes. Ground-based uses include measuring wind speed and direction along with air temperature and density while also detecting and characterizing shear and turbulence.

Non-NASA Applications

Clear-air turbulence is a safety hazard and passenger-comfort issue for the airline industry. SR-CATS will be an integral part of the NextGen instrumentation for the predictive control of gust load alleviation. This will increase passenger and aircraft safety during commercial flights. Damage to equipment caused by severe gusts will be alleviated, thus reducing maintenance costs to airlines.

Firm Contacts

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